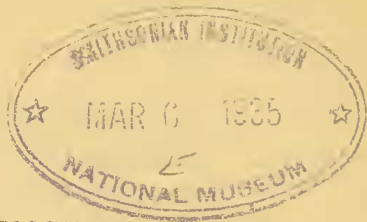


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A REVISION OF TWO SPECIES OF VINCIGUERRIA,  
A GENUS OF DEEP SEA FISHES

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The genus *Vinciguerria* comprises at present six generally accepted species, namely, *V. poweriae* (Cocco); *attenuata* (Cocco); *nimbaria* (Jordan and Williams); *lucetia* (Garman); *raoulensis* (Waite); and *sanzoi* Jespersen and Tåning. Of these, the first four species appear to be valid. On the other hand, *V. raoulensis* is somewhat doubtful, McCulloch suggesting its identity with *V. lucetia*. It was described from a single specimen, checking in all details with the latter species with the exception of the number of dorsal and anal rays. Considering the fragility of these structures it is possible that an injury caused the loss of a few of the rays. Furthermore, *V. sanzoi* is identical with *V. nimbaria*, as will be demonstrated.

In distinguishing the various species of this genus, a number of features have been used. A pronounced short-coming of most of these characters is that they exhibit wide ranges of variation and a striking degree of overlapping. Two exceptions to this general rule were apparently formed by the number of gill rakers on the first branchial arch, and by a pair of photophores occurring on the chin

of certain species. These two characters have been carefully examined in the course of the present investigation. The result of this study shows the former character to be an excellent and reliable differentiating feature, while the latter is of questionable systematic value. These photophores are evidently the anterior members of the upper lateral rows of organs, separated by a relatively wide space from the second organs, but still an integral part of these rows. Therefore, no great importance can be attached to the presence or absence of these members, but such inconstancy must rather be considered as a simple numerical variation at the anterior end of a linear series. No comparable systematic significance has been attributed to similar variations commonly found posteriorly in these rows. The presence or absence of any single organ in such a varying series cannot be taken as a non-intergrading difference of any appreciable importance. This conclusion is based upon the fact that among the specimens of *Vinciguerria lucetia* examined, one individual had but one photophore, on the right side of the symphysis with no indication of any such member on the left, while an additional two specimens entirely lacked these photophores at the symphysis. These three specimens were mature individuals and were identical in every other respect with the other members of the species.

Because of lack of material of *Vinciguerria poweriae* and *V. attenuata* it is impossible to venture a discussion of the status of these two forms. However, it was deemed advisable to give a redescription of *V. lucetia* and *V. nimbaria* to clarify their relationships and status in the genus. It will be noticed in the following descriptions that *V. nimbaria* possesses fewer gill rakers, a slightly greater number of photophores in the upper lateral row, and a slightly greater body depth than *V. lucetia*.

For convenience the two lateral rows of photophores are divided into the following natural series: symphysis to pectorals, (S-P); isthmus to pectorals, (I-P); pectorals to ventrals, (P-V); ventrals to anal, (V-A); anal to caudal base, (A-C).

**Vinciguerria lucetia (Garman)**

*Maurolucus lucetius* Garman, Mem. Mus. Comp. Zool., 24, 1899, p. 242, pl. J, fig. 2.

*Zalarges lucetius* Brauer, Wiss. Ergebnisse Deutsch. Tiefsee-Exp. "Valdivia," 1906, 1, p. 96, fig. 40; 2, p. 186, taf. 36, fig. 9; Gilbert, Mem. Mus. Comp. Zool., 26, 1908, p. 237; Weber and Beaufort, Fish. Indo-Austral. Arch., 2, 1913, p. 119, fig. 44; Weber, "Siboge" Fische, 1913, p. 21; Regan, Larval Fish. "Terra Nova," 1916, p. 137, figs. 6, 7; Jespersion and Tåning, Vid. Medd. Dansk. Nat. For., 70, 1919, p. 219; McCulloch, Rec. Austral. Mus., 14, 1923, p. 115; Jespersion and Tåning, Rep. Danish Ocean. Exped. 1908-10, 2A, 12, 1926, pp. 22, 23, 27-30; Jordan, Evermann and Clark, Rep. U. S. Comm. Fish., 1928, 2 (1930), p. 73; Norman "Discovery" Repts., 2, 1930, p. 290-291; Parr, Bull. Bingham Ocean. Inst., 2, 4, p. 11.

**DESCRIPTION:** Mature specimens, 25 mm. to 52 mm. standard length. Depth of body increasing with age, greatest depth immediately behind posterior margin of opercle, 5.9 (5.5-6.7) in standard length. Depth at anus 8.3 (7.7-9.1) in standard length. Least depth of caudal peduncle 2.8 (2.3-3.2) in greatest depth. Length of head 3.8 (3.3-4.2) in standard length. Horizontal diameter of orbit 0.7 (0.5-1.0) in length of snout, 3.0 (2.6-3.7) in head. Maxillary 1.4 (1.3-1.8) in head. Lower jaw extending slightly beyond upper. The entire edge of maxillary and dentary studded with subulate teeth which are compressed laterally and curved posteriorly; on the maxillary one or two short teeth, sometimes directed anteriorly, occur between regularly spaced longer ones; those on dentaries irregularly unequal in length and crowded together. Four or five teeth on palatines. One tooth on each side of vomer. Snout to origin of dorsal fin 1.7 (1.6-1.8) in standard length; fin of 14-15 rays; first ray 1.9 (1.7-2.1) in fourth, which is longest, being 2.1 (2.1-2.3) in head; succeeding rays decreasing regularly in length. Origin of anal fin vertically below eighth, ninth or tenth ray of dorsal; fin of 15 (14-16) rays; first ray 1.9 (1.8-2.0) in third or fourth, which is longest, being 2.9 (2.7-3.0) in head; remaining rays decreasing evenly in length. Pectoral base vertically below posterior edge of opercle; fin of ten rays, one specimen with nine. Pelvics located about midway between tip of snout and base of caudal; fin of seven rays, with distal third of each split; longest ray 2.4 (1.6-3.0) in head. Adipose fin located vertically above last anal ray; its length from anterior edge of base to tip 1.9 (1.6-2.0) in horizontal diameter of orbit. Caudal lunate; the fragility of the caudal rays makes comparative measurements doubtful.

The deciduous nature of the scales makes it improbable that a preserved specimen with complete squamation will be observed. On those specimens examined, however, several scattered groups of cycloid scales indicate complete covering of body in life.

All photophores are directed ventrally; the lens increasing in size with age and appearing as a silver sphere, its dorsal half surrounded by a layer of black pigment. A photophore on preorbital at lower anterior margin of orbit; one at lower posterior margin of orbit; a third immediately behind margin of preopercle, approximately on horizontal through center of orbit. Two rows of organs along each side of ventral part of body. Origin of lower row on vertical of anterior margin of orbit, extending to base of caudal. Upper row with origin at symphysis of dentary, extending to base of anal fin. The S-P, I-P, and P-V series in the individual specimens are usually constant in the number of organs on the right and left sides.

It is interesting to note that, in case the number of organs in one of the series varies from the average for the species, an equalizing variation is likely to occur in the following series. For example, if

the V-A series has nine organs (one below average), the A-C series may have fifteen organs (one above average). The result is that the variation in any one series may be greater than that for the row.

MEASUREMENTS: The following table shows ray counts and measurements in hundredths of body length, representing twenty-two specimens.

Length of head.....	26 (24-30)
Depth of body.....	17 (15-18)
Depth at anus.....	12 (11-13)
Depth at caudal peduncle.....	6 ( 5- 7)
Length of snout.....	7 ( 5- 8)
Horizontal diameter of orbit.....	9 ( 7-10)
Length of maxillary.....	19 (17-20)
Snout to anal.....	72 (69-74)
Snout to dorsal.....	59 (54-64)
Snout to pelvics.....	50 (49-51)
Length of pelvics.....	12 (10-15)
Number of dorsal rays.....	15 (14-15)
Number of anal rays.....	15 (15-16)
Number of gill rakers.....	30 (27-35)

PHOTOPHORES: The following table shows the numbers and variations of the photophores of the same group:

Series	S-P	I-P	P-V	V-A	A-C	Totals
Lower...	.....	10 (10-10)	12 (11-13)	10 ( 9-10)	14 (12-16)	46 (44-47)
Upper...	11 (10-11)	.....	12 (11-12)	11 (10-11)	.....	33 (33-34)

MATERIAL: Through the courtesy of the California Academy of Sciences, I have been able to study specimens of *Vinciguerria lucetia*, collected by the Templeton Crocker Expedition of 1932 to the Galapagos Islands, from the following locations: Guadalupe Island, 10 specimens; Maria Madre Island, 8 specimens; Unknown locality, 1 specimen. Also through the Hydrobiological Survey of Hopkins Marine Station, I have had access to collections made by Mr. E. C. Scofield containing the following specimens: 32° 42' N. Lat., 122° 33' W. Long., 1 specimen; 32° 32' N. Lat., 117° 29' W. Long., 1 specimen. One specimen examined from Galapagos Islands, Natural History Museum, Stanford University, No. 8095.

JUVENILE SPECIMENS: The specific determination of juvenile specimens of this genus is extremely difficult because the proportions of the body structures change markedly as maturity is reached. As Tåning points out the only infallible character for such a determination is the number of gill rakers on the first branchial arch. A comparison of measurements of the mature and the juvenile individuals as found in the tables will show the general bodily differences. The length of the head in the young specimens is proportionally shorter

than that of the mature group. Even more distinct is the slender body of the juvenile individuals.

The photophores increase in size with age, the lens and pigment each developing proportionally. These organs also increase in number, especially in the V-A series of the upper row. This increase continues until the specimen has reached approximately 25 mm. in length. The photophores in the head are generally the smallest. This is especially true of the organ on the preopercle, which is usually the last of the cephalic organs to develop. On two small specimens, this photophore was absent on both sides of the head while on another it was present on one side and absent on the other. These specimens were typical in all other respects.

**MEASUREMENTS:** The following table shows ray counts and measurements in hundredths of body length, representing nine juvenile specimens:

Length of head.....	24 (20-26)
Depth of body.....	14 (10-15)
Depth at anus.....	10 ( 9-10)
Depth at caudal peduncle.....	5 ( 4- 5)
Length of snout.....	5 ( 4- 5)
Horizontal diameter of orbit.....	6 ( 3- 8)
Length of maxillary.....	14 (10-18)
Snout to anal.....	70 (68-75)
Snout to dorsal.....	55 (52-69)
Snout to pelvics.....	47 (45-50)
Length of pelvics.....	10 (10-11)
Number of dorsal rays.....	14 (14-15)
Number of anal rays.....	14 (13-16)

**PHOTOPHORES:** Table showing number and variation of photophores of juvenile group:

<i>Series</i>	<i>S-P</i>	<i>I-P</i>	<i>P-V</i>	<i>V-A</i>	<i>A-C</i>	<i>Totals</i>
Lower....	.....	10 (9-10)	12 (11-13)	10 (9-10)	14 (12-15)	45 (43-46)
Upper....	11 (9-12)	.....	12 (11-12)	9 (7-10)	.....	32 (30-33)

**MATERIAL:** The Hydrobiological Survey collection contained eight juvenile specimens from the following locations: 33° 42' N. Lat., 122° 33' W. Long., 1 specimen; 33° 42' N. Lat., 121° 24' W. Long., 1 specimen; 32° 32' N. Lat., 117° 20' W. Long., 2 specimens; 23° 45' N. Lat., 111° 10' W. Long., 2 specimens; 28° 25' N. Lat., 117° 17' W. Long., 2 specimens. One specimen, No. 20199, Albatross Hyd. Station 3798, Marquesas Islands, Natural History Museum of Stanford University.

### *Vinciguerria nimbaria* (Jordan and Williams)

- Zalarges nimbarius* Jordan and Williams, in Jordan and Starks, Proc. Calif. Acad. Sci., (2) 5, 1896, p. 793, pl. 76; Snodgrass and Heller, Proc. Wash. Acad. Sci., 6, 1905, p. 349; Jordan and Seale, Bull. U. S. Bur. Fish. 15, 1906, p. 189.
- Vinciguerria nimbaria* Gilbert, Mem. Mus. Comp. Zool., 26, 1908, p. 237; Jordan, Evermann and Clark, Rep. U. S. Comm. Fish., 1928, 2 (1930), p. 73; Norman, "Discovery" Repts., 2, 1930, p. 292.
- Vinciguerria sanzoi* Jespersen and Tåning, Rep. Danish Ocean. Exped., 1908-10, 2A, 12, 1926, p. 22-30.

DESCRIPTION: Greatest depth of body 5.5 (5.0-6.2) in standard length. Depth at anus 7.1 (6.7-7.7) in standard length. Least depth of caudal peduncle 2.8 (2.5-3.3) in greatest depth. Length of head 3.8 (3.4-4.2) in standard length. Horizontal diameter of orbit 0.7 (0.6-0.7) in snout, 3.1 (2.1-3.3) in head. Maxillary 1.4 (1.2-1.3) in head. Lower jaw extending beyond upper. Maxillary and dentary studded with subulate teeth as in *Vinciguerria lucetia*. Snout to origin of dorsal fin 1.7 (1.6-1.8) in standard length; fin of 15 (13-15) rays. Origin of anal fin vertically below ninth or tenth ray of dorsal; fin of 15 (13-15) rays. Pectoral base vertically below posterior edge of opercle; fin of 10-11 rays. Pelvics located at a point slightly posterior of a line midway between tip of snout and base of caudal; fin of seven rays. Adipose fin located vertically above base of anal fin.

The photophores arranged on body as in *Vinciguerria lucetia*. However, the number of organs in the upper row is greater, the average being 35 instead of 33. This is largely due to the increase in number of organs in the P-V series.

MEASUREMENTS: Ray counts and measurements in hundredths of body length based on seven specimens of *Vinciguerria nimbaria*:

Length of head.....	26 (24-29)
Depth at body.....	18 (16-20)
Depth at anus.....	14 (13-15)
Depth at caudal peduncle.....	6 ( 6- 7)
Length of snout.....	6 ( 6- 6)
Horizontal diameter of orbit.....	9 ( 8- 9)
Length of maxillary.....	18 (17-20)
Snout to anal.....	72 (70-72)
Snout to dorsal.....	58 (55-61)
Snout to pelvics.....	53 (52-54)
Length of pelvics.....	10 (10-12)
Number of dorsal rays.....	15 (13-15)
Number of anal rays.....	15 (13-15)
Number of gill rakers.....	20 (18-22)

PHOTOPHORES: Number and variations of photophores of the above group:

Series	S-P	I-P	P-V	V-A	A-C	Totals
Lower...	.....	10 (10-10)	13 (12-14)	10 ( 9-10)	14 (13-15)	46 (45-47)
Upper...	11 (11-11)	.....	13 (12-14)	11 (10-11)	.....	35 (34-35)

MATERIAL: Dr. A. Vedel Tåning of the Marinbiologisk Laboratorium in Copenhagen kindly sent me five representative specimens

of this species from the following localities: 28° 48' N. Lat., 20° 45' W. Long., 3 specimens; 14° 38' N. Lat., 61° 16' W. Long., 2 specimens. In the Natural History Museum of Stanford University I have examined the two syntypes from the open Pacific, No. 3125.

REMARKS: In the course of my study of *Vinciguerria lucetia* the desirability of a reexamination of the original material of *V. nimbaria* became apparent. This inquiry revealed that at least three important errors had been made in the type description of this species. Jordan and Williams record "dorsal fin of nine rays," their figure shows fifteen; however, examination of the two syntypes reveals that one has thirteen and the other fourteen rays. This error was pointed out by Gilbert (1908). While the type description states "adipose fin not evident, perhaps obliterated," a complete and evident adipose fin is present on both specimens, as was pointed out by Snodgrass and Heller (1905). Finally, two teeth are found on the vomer of each specimen, instead of "no teeth on vomer" as recorded. In view of these errors the identification of a specimen of this species was impossible without recourse to the syntypes.

As the study of specimens and of literature progressed the similarity between *Vinciguerria nimbaria* and *V. sanzoi* became very evident. After receiving specimens labeled *V. sanzoi* from Dr. Tåning, a careful comparison revealed these to be identical with *V. nimbaria*. The errors of the type description of *V. nimbaria* left Jespersen and Tåning no other course than to describe their specimens as representing a new species. It is, indeed, unfortunate that the rules of priority necessitate the substitution of the obscure name *V. nimbaria* for the much better known one of *V. sanzoi*, which has been applied to the large number of Atlantic specimens upon which the species has been so well characterized.

I am greatly indebted to Dr. Rolf L. Bolin and Dr. Tage Skogsberg of the Hopkins Marine Station for their active interest and helpful suggestions during the writing of this report.

